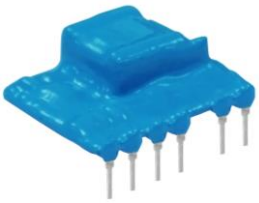
MORNSUN®

LS01(-F) Series

1W, AC-DC(HIGH VOLTAGE DC-DC) CONVERTER



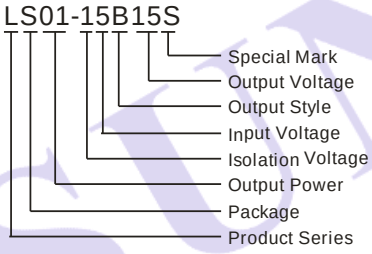
RoHS c UL us

LS01(-F) Series ----- are high efficiency green power modules with miniature packaging provided by Mornsun. The features of this series are: wide input voltage, DC and AC all in one, high efficiency, high reliability, low loss, safety isolation etc, meet UL60950/EN60950 standards. All models are particularly suitable for the applications demanding on the volume, need to meet UL/CE standard, less demanding on EMC like industrial, electric power, instrumentation, smart home. For harsh EMC environment, this series of products must use the refered application circuit.

FEATURES

1. Wide input voltage:85 ~ 264VAC(70 ~ 400VDC)
2. Over current protection and short circuit protection
3. High efficiency, high density
4. Low loss, green power
5. Industrial design
6. Ultra-Miniature package
7. 90 degree curved series, minimizing product height
8. Certificate UL60950/EN60950 standards

PART NUMBER SYSTEM



SELECTION GUIDE

Approval	Model	Power	Output (Vo/Io)	Max. Capacitive Load (μF)	Ripple and Noise (Max.)	Efficiency (%) (230VAC,Typ.)	Standby Power(Max.)
UL/CE (beside "-F")	LS01-15B05S(-F)*	1W	5V/200mA	220	120mV	66	0.5W
	LS01-15B09S(-F)		9V/111mA	100		67	
	LS01-15B12S(-F)		12V/83mA	100		70	
	LS01-15B15S(-F)		15V/67mA	100		69	
	LS01-15B24S(-F)		24V/42mA	100		68	

Note: *The model of 90 degrees of corner is with F. For example the LS01-15B12S of 90 degrees of corner product is LS01-15B12S-F.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	AC Input	85	--	264	V
	DC Input	70	--	400	
Input Frequency		47	--	440	Hz
Input Current	115VAC	--	--	0.12	A
	230VAC	--	--	0.04	
Inrush Current	115VAC	--	10	--	
	230VAC	--	20	--	

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy	LS01-15B05S(-F)	--	--	±10.0	%
	LS01-15B09S(-F)	--	--	±5.0	
	LS01-15B12S(-F)				
	LS01-15B15S(-F)				

PowerPax UK Ltd
Unit 5 Kennet Weir Business Park, Arrowhead Road, Theale, Berkshire, RG7 4AD, United Kingdom
Tel: +44 (0) 118 9033290 Fax: +44 (0) 118 9033291
info@powerpaxuk.com Website: www.mornsun.co.uk

	LS01-15B24S(-F)				
Line Regulation	full load	--	±1.5	--	
Load Regulation	5% to 100%	--	±2.5	--	
Ripple& Noise(p-p) 20MHz bandwidth	LS01-15B05S(-F)	--	50	120	mV
	LS01-15B09S(-F)				
	LS01-15B12S(-F)				
	LS01-15B15S(-F)				
	LS01-15B24S(-F)				
Min Load		5	--	--	%
Hold-up Time	115VAC	80	--	--	ms
	230VAC	300	--	--	
Short Circuit Protection		Continuous, and auto recovery			
Over Current Protection		Auto recovery			

COMMON SPECIFICATIONS

Item	Test Conditions		Min.	Typ.	Max.	Unit
Operating Temperature			-40	--	+85	℃
Storage Temperature			-40	--	+105	
Case temperature			--	--	+90	
Storage Humidity			--	--	85	%RH
Temperature coefficient			--	±0.1	--	%/℃
Power derating	-40℃~-20℃		1	--	--	
	+55℃~+85℃		0.67	--	--	
Isolation Resistance			100	--	--	MΩ
Isolation Voltage	input-output	Tested for 1 minute	3000	--	--	VAC
Switching Frequency			--	--	50	kHz
Weight			--	8	--	g
Welding Temperature	Wave-soldering		260± 5℃; time:5~10s			
	Manual-welding		360± 10℃; time:3~5s			
Safety approvals			UL60950/EN60950			
Safety Class			CLASS II			
Safety standards			UL60950/EN60950			
Hot swap			Forbid			
Case Material Grade			UL 94V-0			
Install			PCB			
Cooling			Free air convection			
MTBF			＞300,000 h @ 25℃			

Note: 1. External electrolytic capacitors are required to modules, more details refer to typical applications.
2. Ripple and Noise measuring refer to “ripple and noise measure figure”.
3. All specifications were measured at Ta=25°C, humidity<75%, nominal input voltage （115VAC or 230VAC）and rated output load unless otherwise specified.
4. In this datasheet, all the test methods of indications are based on corporate standards.
5. Module required dispensing fixed after assembled.

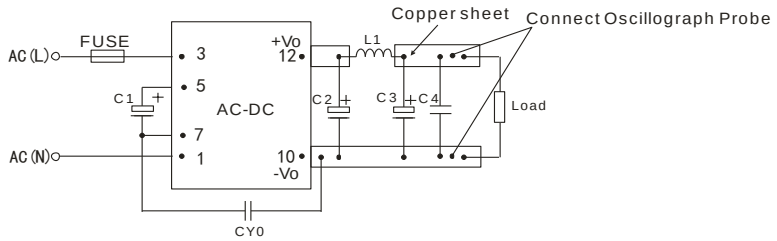
EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022, CLASS A (Typical Application Circuit Refer to Figure 1)	
		CISPR22/EN55022, CLASS B (Recommended Circuit Refer to Figure 3)	
	RE	CISPR22/EN55022, CLASS A (Typical Application Circuit Refer to Figure 1)	
		CISPR22/EN55022, CLASS B (Recommended Circuit Refer to Figure 3)	
EMS	ESD	IEC/EN61000-4-2 Contact ±4KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m (Recommended Circuit Refer to Figure 3)	perf. Criteria A
	EFT	IEC/EN61000-4-4 ±2KV (Typical Application Circuit Refer to Figure 1)	perf. Criteria B

PowerPax UK Ltd
Unit 5 Kennet Weir Business Park, Arrowhead Road, Theale, Berkshire, RG7 4AD, United Kingdom
Tel: +44 (0) 118 9033290 Fax: +44 (0) 118 9033291
info@powerpaxuk.com Website: www.mornsun.co.uk

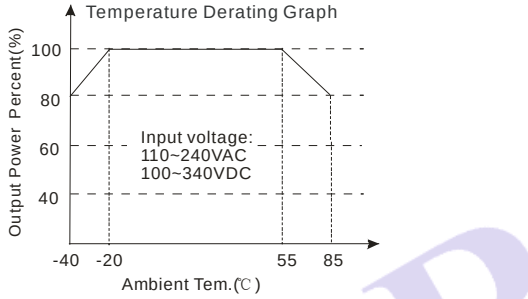
		IEC/EN61000-4-4	±4KV (Recommended Circuit Refer to Figure 3)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±1KV/±2KV (Recommended Circuit Refer to Figure 3)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s (Recommended Circuit Refer to Figure 3)	perf. Criteria A
	PFM	IEC/EN61000-4-8	10A/m	perf. Criteria A
	Voltage dips, short and interruptions immunity	IEC/EN61000-4-11	0%-70%	perf. Criteria B

RIPPLE AND NOISE MEASURE FIGURE RIPPLE

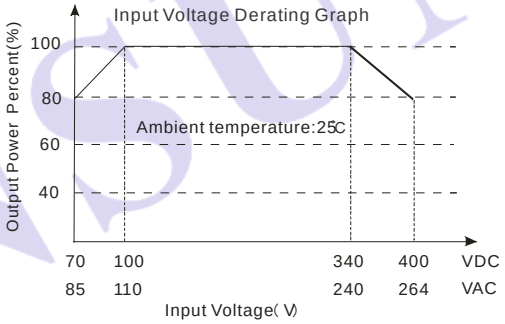


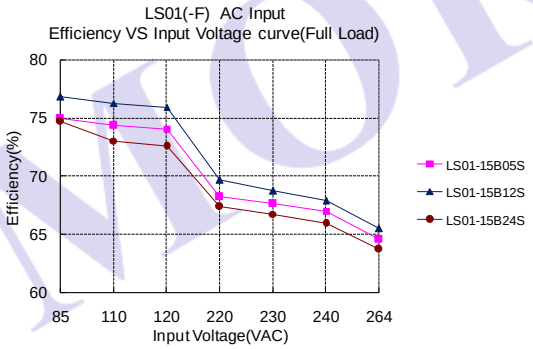
Note：CY0 is 1nF/400VAC Y1 capacitor, C1,C2,L1,C3,C4 refer to" EXTERNAL CIRCUIT PARAMETERS"

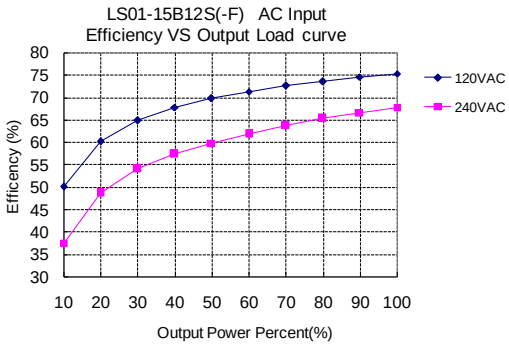
PRODUCT TYPICAL CURVE

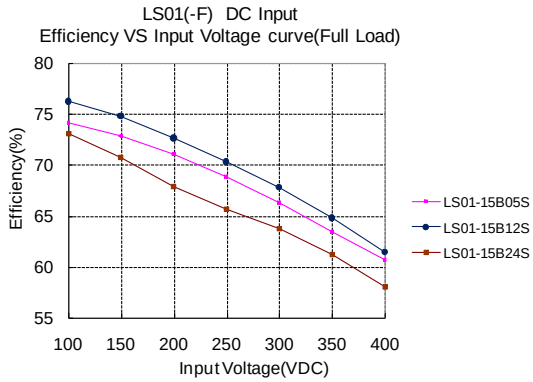


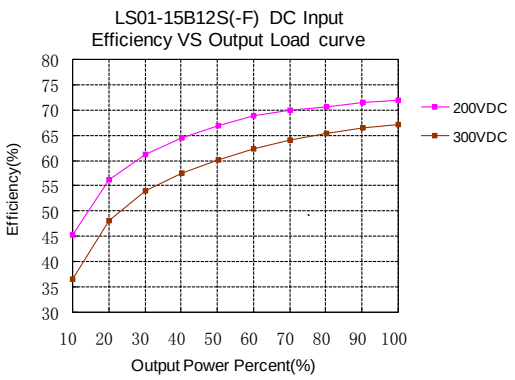
Note: When input 85~110VAC /240~264VAC/70~100VDC/340~400VDC, it need to be voltage derated on basis of temperature derating.











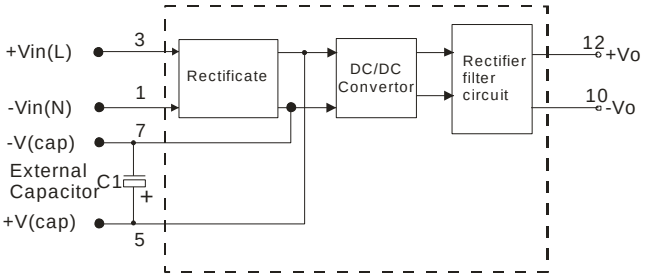
STRUCTURE FIGURE

PowerPax UK Ltd

Unit 5 Kennet Weir Business Park, Arrowhead Road, Theale, Berkshire, RG7 4AD, United Kingdom

Tel: +44 (0) 118 9033290 Fax: +44 (0) 118 9033291

info@powerpaxuk.com Website: www.mornsun.co.uk



TYPICAL APPLICATIONS

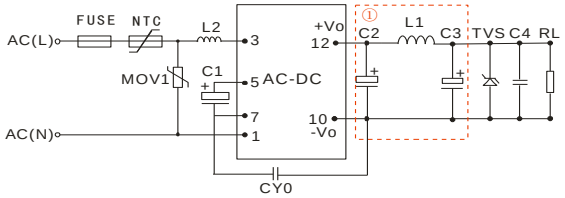
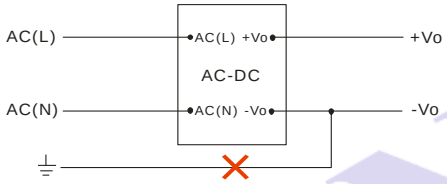


Figure 1: Typical application circuit

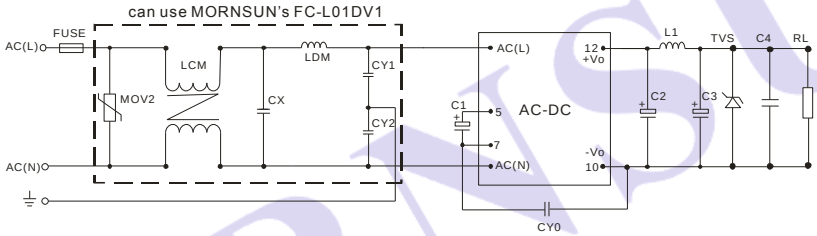
Note: ①is Pi filter circuit.



(Figure 2): This application is not available for this series.

Note: If you have such application, please consult to our FAE department.

EMC RECOMMENDED CIRCUIT



(Figure 3): series recommended circuit for applications which require higher EMC standard

EMC RECOMMENDED CIRCUIT PCB LAYOUT

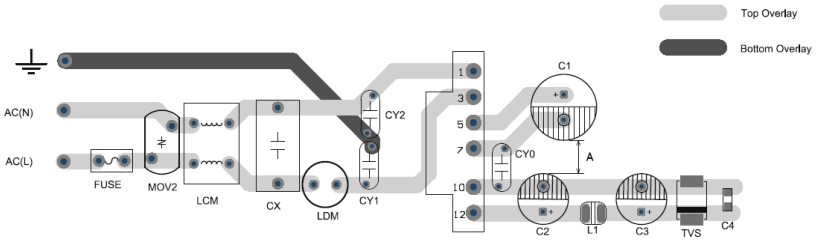


Figure 4: EMC application circuit PCB layout

Safety and recommend wiring: linewidth ≥3mm, line-line distance≥6mm, line- ground distance≥6mm,A≥6.4mm

EXTERNAL CIRCUIT PARAMETERS									
Model	C1 (Required)	L2	C2 (Required)	L1 (Required)	C3 (Required)	C4	CY0	FUSE (Required)	TVS
LS01-15B05S(-F)	10μF/400V	1mH	150μF/35V	2.2μH	68μF/35V	0.1μF/50V	1nF/400V AC	1A/250V	SMBJ7.0A
LS01-15B09S(-F)									SMBJ12A
LS01-15B12S(-F)			100μF/35V						SMBJ20A
LS01-15B15S(-F)									
LS01-15B24S(-F)									SMBJ30A

PowerPax UK Ltd

Unit 5 Kennet Weir Business Park, Arrowhead Road, Theale, Berkshire, RG7 4AD, United Kingdom

Tel: +44 (0) 118 9033290 Fax: +44 (0) 118 9033291

info@powerpaxuk.com Website: www.mornsun.co.uk

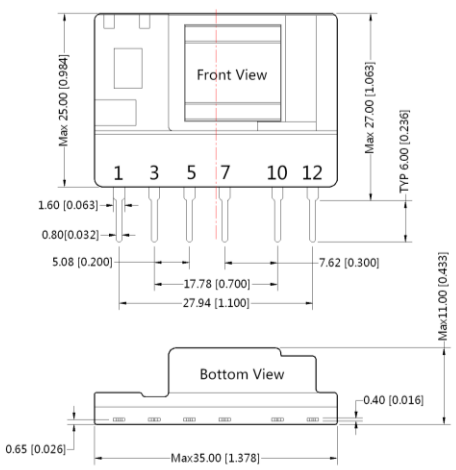
Note:

1. C1and C3 are electrolytic capacitors. They are required both AC input and DC input.
   When AC input,C1 is used as filter capacitor, the value of C1 is recommended to be 10μF /400V.When DC input, C1 is used as EMC filter capacitor, the value of C1 is recommended to be 10μF/400V(when the input voltage is above 370VDC, the recommended value of C1 is 10μF/450V).C2 and C3 are output filer capacitors, they are recommended to be high frequency and low impedance electrolytic capacitors. Capacitance and rated ripple current of capacitors refer to the datasheets provided by the manufactures. Voltage derating of capacitors should be 80% or above. C4 is a ceramic capacitor, which is used to filter high frequency noise. C2,C3 and L1 form a pi-type filter circuit. Current of L1 and L2 refer to the datasheets provided by the manufactures, current derating should be 80% or above. TVS is a recommended component to protect post-circuits (if converter fails). External input NTC is recommended to use 5D-9.External input MOV1 is recommended to use S14K350.
2. For standard EMC requirement, please refer to figure 1.If higher EMC requirement ,please refer to figure 3, recommended parameters are shown in the table below.

Recommend Parameter For Higher EMC Standard Circuit	
Components	Recommend Parameter
MOV2	S10K300
CY1, CY2	1nF/400VAC
CX	0.1μF/275VAC
LCM	3.5mH
LDM	5mH
FC-L01DV1	MORNSUN's 1KV/2KV Surge protector
FUSE	1A/250V, slow blow, it must be connected to FUSE

LS01 DIMENSIONS, RECOMMENDED FOOTPRINT&PACKAGING

MECHANICAL DIMENSIONS



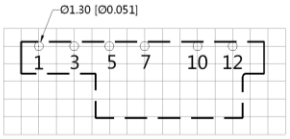
PIN CONNECTION	
Pin	Function
1	-Vin(N)
3	+Vin(L)
5	+V(cap)
7	-V(cap)
10	-Vo
12	+Vo

1.It is necessary to add C1 between pin5 and pin7
2.It is necessary to add pi-type filter circuit to the output,such as the typical application of Figure 1

Note:
Unit :mm[inch]
Pin section tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]

THIRD ANGLE PROJECTION

RECOMMENDED FOOTPRINT DETAILS



Note:Grid 2.54*2.54mm

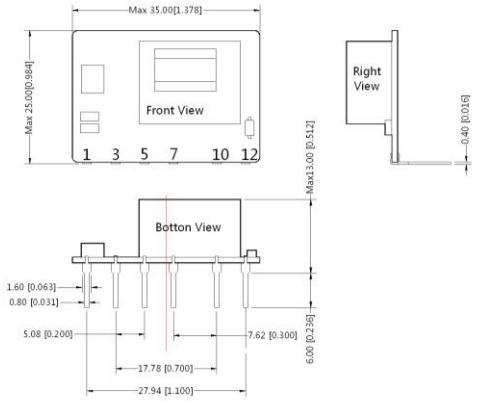
PACKAGE DIAGRAM

Note:
Unit :mm[inch]
Inner carton dimensions: L*W*H=355*192*93
Packaging quantity: 100pcs
Outer carton dimensions: L*W*H=405*380*305
Packaging quantity: 600pcs

LS01-F DIMENSIONS, RECOMMENDED FOOTPRINT&PACKAGING

PowerPax UK Ltd
Unit 5 Kennet Weir Business Park, Arrowhead Road, Theale, Berkshire, RG7 4AD, United Kingdom
Tel: +44 (0) 118 9033290 Fax: +44 (0) 118 9033291
info@powerpaxuk.com Website: www.mornsun.co.uk

MECHANICA DIMENSIONS



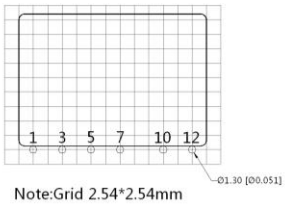
PIN CONNECTION	
Pin	Function
1	-Vin (N)
3	+Vin (L)
5	+V(cap)
7	-V(cap)
10	-Vo
12	+Vo

1.It is necessary to add C1 between pin5 and pin7 ;
2.It is necessary to add pi-type filter circuit to the output,such as the typical application of Figure 1.

Note:
Unit :mm[inch]
Pin section tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]

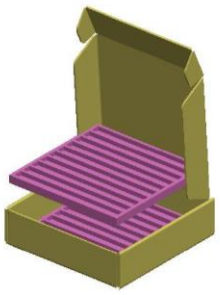
THIRD ANGLE PROJECTION

RECOMMENDED FOOTPRINT DETAILS



Note:Grid 2.54*2.54mm

PACKAGE DIAGRAM



Note:
Unit :mm[inch]
Inner carton dimensions: L*W*H=365*350*105
Packaging quantity : 360pcs
Outer carton dimensions : L*W*H=390*360*245
Packaging quantity: 720pcs

PowerPax UK Ltd
Unit 5 Kennet Weir Business Park, Arrowhead Road, Theale, Berkshire, RG7 4AD, United Kingdom
Tel: +44 (0) 118 9033290 Fax: +44 (0) 118 9033291
info@powerpaxuk.com Website: www.mornsun.co.uk